Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Digital Signal Processing **Semester: VI**
Program: B.Tech-CSE-All **Time: 03 hrs.**
Course Code: CSEG 3042P **Max. Marks: 100**
Instructions: Explain in short. (60-70 words)

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Discuss the advantages of Digital Signal Processing over Analog Signal Processing.	**4**	**CO1**
Q 2	What is the significance of DTFT? Discuss any five properties of Discrete Time Fourier Transform (DTFT).	**4**	**CO2**
Q 3	List the properties of FIR and IIR filters	**4**	**CO2**
Q 4	How twiddle factor is used to get the phase factors inverse FFT and inverse DFT computation.	**4**	**CO3**
Q 5	Detail the concept of estimation of quantization noise power.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)
Instruction: Write brief notes. (100-150 words)

Q 6	(a) Given x(n) = {1, 0, -1, 0}, Find X(k) using DIT-FFT algorithm with complete structure of signal flow and computation. (b) Check whether the given signals are causal or non-causal $y(n) = a.x(n)$ $y(n) = x(n) + 3x(n+4)$	**6+4**	**CO1**
Q 7	Discuss the convolution of two signals in details. Determine the convolution of two signals $x(n) = \{1, 2, 3, 4\}$ $h(n) = \{2, 2, 3, 1\}$	**10**	**CO2**
Q 8	Give example of floating point and fixed point numbers. Detail the concept of rounding and truncation errors **OR** Determine the DFT of the following sequence using direct method x(n) = {1/4, 1/4, 1/4}	**10**	**CO2**
Q 9	Detail the sampling theorem and interpolation in multirate DSP.	**10**	**CO3**

SECTION-C (2Q x 20M = 40 Marks)			
Q 10	Detail the significance of frequency sampling method for FIR filter design. Discuss the role of window methods with complete description of Hamming and Hanning functions in the design. **OR** Discuss the significance of Direct form realization of IIR systems as Direct from-I and direct form-II. Realize the following difference equation in both forms $y(n) = b_0x(n) + b_1x(n-1) + b_2x(n-2) + b_3x(n-3) - a_1y(n-1) - a_2y(n-2) - a_3y(n-3)$	**20**	**CO1**
Q 11	(a) Detail the signal flow graph if radix-2 FFT algorithms from first, second and third stage using DIT-FFT or DIF-FFT algorithms. (b) Computer the FFT for the following sequence using either DIT-FFT or DIF-FFT algorithm with compete description of flow diagram. $x(n) = \{1,2,3,4,4,3,2,1\}$	**20**	**CO3**